

We Claim:

1. A process for making a catalyst component comprising:
 - a) generating a reaction product A by contacting a magnesium dialkoxide compound with a halogenating agent;
 - b) contacting reaction product A with a first halogenating/titanating agent to form reaction product B;
 - c) contacting reaction product B with a second halogenating/titanating agent to form reaction product C; and
 - d) contacting reaction product C with a third halogenating/titanating agent to form catalyst component D.
2. The process of claim 1 wherein the halogenating agent is of the general formula ClAR''_x , wherein A is a nonreducing oxyphilic compound, R'' is a hydrocarbyl moiety having from about 2 to 6 carbon atoms, and x is the valence of A minus 1.
3. The process of claim 1 wherein the halogenating agent is $\text{ClTi(O}^{\text{i}}\text{Pr})_3$.
4. The process of claim 1 wherein the first halogenating/titanating agent is a blend of two tetra-substituted titanium compounds with all four substituents being the same and the substituents being a halide or an alkoxide or phenoxide with 2 to 10 carbon atoms.
5. The process of claim 4 wherein the first halogenating /titanating agent is a blend of a titanium halide and an organic titanate.
6. The process of claim 5 wherein the first halogenating/titanating agent is a blend of TiCl_4 and Ti(OBu)_4 in a range from 0.5:1 to 6:1 $\text{TiCl}_4/\text{Ti(OBu)}_4$.
7. The process of claim 1 wherein the second and third halogenating/titanating agents comprise titanium tetrachloride.

8. The process of claim 7 wherein steps c) and d) each comprise a titanium tetrachloride to magnesium ratio in the range of about 0.1 to about 5.

9. The process of claim 1 wherein reaction products A, B, and C are washed with a hydrocarbon solvent prior to subsequent halogenating/titanating steps.

10. The process of claim 9 wherein reaction products A, B, and C are washed with a hydrocarbon solvent until titanium species [Ti] content is less than about 100 mmol/L prior to subsequent halogenating/titanating steps.

11. The process of claim 1 wherein the reaction product D is washed with a hydrocarbon solvent until titanium species [Ti] content is less than about 20 mmol/L.

12. The process of claim 1 wherein an electron donor is present in any one or more of steps a), b), c), or d), and wherein the ratio of electron donor to metal is in the range of about 0:1 to about 10:1.

13. The process of claim 1 further comprising placing the catalyst of the invention on an inert support.

14. The process of claim 13 wherein the inert support is a magnesium compound.

15. The process of claim 1 further comprising: e) contacting D with an organometallic preactivating agent to form a preactivated catalyst system.

16. A catalyst produced by a process comprising:

a) contacting a catalyst component with an organometallic preactivating agent, wherein the catalyst component is produced by a process comprising,

i) contacting a magnesium dialkoxide compound with a halogenating

agent to form a reaction product A;

ii) contacting reaction product A with a first halogenating/titanating agent to form reaction product B;

iii) contacting reaction product B with a second halogenating/titanating agent to form reaction product C; and

iv) contacting reaction product C with a third halogenating/titanating agent to form a catalyst component.

17. The catalyst of claim 16 wherein the organometallic preactivating agent is an aluminum alkyl of the formula AlR_3 wherein at least one R is an alkyl having 1-8 carbon atoms or a halide, and wherein each R may be the same or different.

18. The catalyst of claim 17 wherein the organometallic preactivating agent is a trialkyl aluminum.

19. The catalyst of claim 18 wherein the second and third halogenating/titanating agents comprise titanium tetrachloride.

20. The catalyst of claim 19 wherein the ratio of aluminum to titanium is in the range from 0.1:1 to 2:1.

21. The process of claim 16 wherein reaction products A, B, and C are washed with a hydrocarbon solvent prior to subsequent halogenating/titanating steps.

22. The process of claim 16 wherein the catalyst component is washed with a hydrocarbon solvent until titanium species [Ti] content is less than about 20 mmol/L.

23. A polymer produced by a process comprising:
- a) contacting one or more olefin monomers together in the presence of a catalyst under polymerization conditions, wherein the catalyst is produced by a process comprising
 - i) contacting a magnesium dialkoxide compound with a halogenating agent to form a reaction product A;
 - ii) contacting reaction product A with a first halogenating/titanating agent to form reaction product B;
 - iii) contacting reaction product B with a second halogenating/titanating agent to form reaction product C;
 - iv) contacting reaction product C with a third halogenating/titanating agent to form a catalyst component; and
 - b) extracting polyolefin polymer.
24. The polymer of claim 23 wherein the catalyst is produced by a process further comprising:
- v) contacting the catalyst component with an organoaluminum agent.
25. The polymer of claim 23 wherein the second and third halogenating/titanating agents comprise titanium tetrachloride.
26. The polymer of claim 23 wherein reaction products A, B, and C are washed with a hydrocarbon solvent prior to subsequent halogenating/titanating steps.
27. Film, fiber, pipe, textile material, or an article of manufacture comprising the polymer of claim 23.

28. A process for olefin polymerization, comprising:
- a) contacting one or more olefin monomers together in the presence of a catalyst under polymerization conditions, wherein the catalyst was produced by a process comprising:
- i) contacting a magnesium dialkoxide compound with a halogenating agent to form a reaction product A;
 - ii) contacting reaction product A with a first halogenating/titanating agent to form reaction product B;
 - iii) contacting reaction product B with a second halogenating/titanating agent to form reaction product C;
 - iv) contacting reaction product C with a third halogenating/titanating agent to form a catalyst component to form reaction product D;
- b) extracting a polyolefin polymer;
- wherein at least one reaction product A, B, and C are washed with a hydrocarbon solvent prior to subsequent halogenating/titanating steps; and
- wherein the reaction product D is washed with a hydrocarbon solvent until titanium species [Ti] content is less than about 100 mmol/L.

29. The process of claim 28 wherein the polymer has a molecular weight distribution of at least 4.0.

30. The process of claim 28 wherein the polymer has a bulk density of at least 0.31 g/cc.

31. An article comprising polymer produced by the process of claim 28.